CLAIMS

1. A composition comprising:
   a first nanotube attached to a fiber.

2. The composition of claim 1, wherein the first nanotube has a diameter ranging from about 30 to about 300 nanometers.

3. The composition of claim 1, wherein the first nanotube has a length ranging from about 10 to about 10,000 nanometers.

4. The composition of claim 1, wherein the first nanotube is single-walled or multi-walled.

5. The composition of claim 1, wherein the first nanotube comprises a metal.

6. The composition of claim 5, wherein the metal is rhodium, ruthenium, manganese, chromium, copper, molybdenum, platinum, nickel, cobalt, palladium, gold, or silver.

7. The composition of claim 1, wherein the fiber is an electrospun fiber.

8. The composition of claim 1, wherein the fiber is ceramic, carbonized, elemental, or a chemically tractable metal.

9. The composition of claim 1, wherein the fiber is boron nitride, boron carbide, nitrogen carbide, or silicon.

10. The composition of claim 1, wherein a second nanotube is attached to the first nanotube.

11. A composition comprising:
    a second nanotube attached to a first nanotube.

12. A method comprising the step of:
    growing a nanotube on a fiber substrate.

13. The method of claim 11, wherein the fiber substrate is an electrospun fiber.

14. The method of claim 11, wherein the fiber substrate is ceramic, carbonized, elemental, or a chemically tractable metal.

15. A method comprising the step of:
growing a second nanotube on a first nanotube substrate.

16. The method of claim 14, wherein the second nanotube has a diameter that is less than that of the first nanotube substrate.

17. A method comprising the step of:
using the composition of claim 1 as an electrode.

18. A method comprising the step of:
using the composition of claim 1 as a filtration device.

19. The composition of claim 17, wherein the filtration device has interstices greater than or equal to about two nanometers.

20. A method comprising the step of:
using the composition of claim 1 as an electrochemical connection to the nervous system or an electrochemical connection to the interior of a living cell.

21. A method comprising the step of:
using the composition of claim 1 as a support structure for compounds having characteristic dimensions ranging from about 1 to about 100 nanometers.

22. A method comprising the step of:
performing Raman spectroscopy using the composition of claim 1 as a support structure.

23. A method for manufacturing a metal-containing nanofiber comprising the steps of:
electrospinning a solution comprising an electrospinnable polymer and at least one metal to produce a metal-containing nanofiber; and
carbonizing the resultant metal-containing nanofiber.

24. The method of claim 22, wherein the electrospinnable polymer is polyacrylonitrile.

25. The method of claim 22, wherein the metal is a noble metal.

26. The method of claim 22, wherein the metal is Ag, Fe, Pd, Ni, or Co.

27. A method comprising:
using a hierarchical structure as a fuel-cell electrode.

28. A method comprising:
using a hierarchical structure in an electrophoresis filtration system.

29. A method comprising:
using a hierarchical structure as a conductive medium in a photodiode.

30. The method of claim 28 wherein a carotene-porphyrin-fullerene compound is attached to method for using a hierarchical structure.

31. The method of claim 28, wherein a dendrimer is attached to the hierarchical structure.

32. A method comprising:
using a hierarchical structure in a battery.